Pollution: The Basics

5.1.1 Define the term pollution

- The addition to the biosphere of substances or agents by a human activity @ a greater rate then the environment can deal with it.
  - ↳ Can be delibrate or accidental
  - ↳ has an impact on ecosystems & organisms (air, soil & water)
  - Can also be caused by natural elements: ex. Red Tide or Volcanoes

5.1.2 Distinguish between the terms point-source pollution and non-point source pollution, and outline the challenges they present for management

Point Source Pollution — ex. Chernobyl, Bhopal Disaster

- ↳ discrete Sources of Contaminants
- ↳ can be tracked back to a source

⇓

Easy to manage
- easy to regulate/control
- place responsibility
- take legal action
- clean up local area

Non-Point Source Pollution — ex. vehicle, agricultural runoff

- ↳ dispersed sources of Contaminants
- ↳ Very hard/impossible to track

⇓

Very hard to manage & Regulate

5.1.3 State the major sources of pollution

- Combustion of Fossil Fuels → CO_2, SO_x, NOx, T. ozone, VOCs, CO → Greenhouse Effect, Climate Change, Acid Deposition
- Domestic Waste → Food & Sewage, Paper, Plastics, glass → Eutrophication, Disease, Fills Landfills
- Industrial Waste → Heavy metals, Fluorides, Heat, Pb, Acids → Poisoning, less DO, mental issues
- Agricultural Waste → Nitrates & Phosphates, Pesticides → Eutrophication, Disease, Biomagnification

Measure Results of Pollutants NOT Pollutant Itself

↑BOD = ↓levels of O_2

Indirect Methods for Measuring Pollution

5.2.2 Define the term biochemical oxygen demand (BOD) and explain how this indirect method is used to assess pollution levels in water

Aerobic Organisms use O_2 during cell Respiration → BOD determined by # of orgs & rate of Respiration

- Organic Pollutants → increase in orgs that feed on O. pollutants → these orgs use up O_2 → HIGH BOD

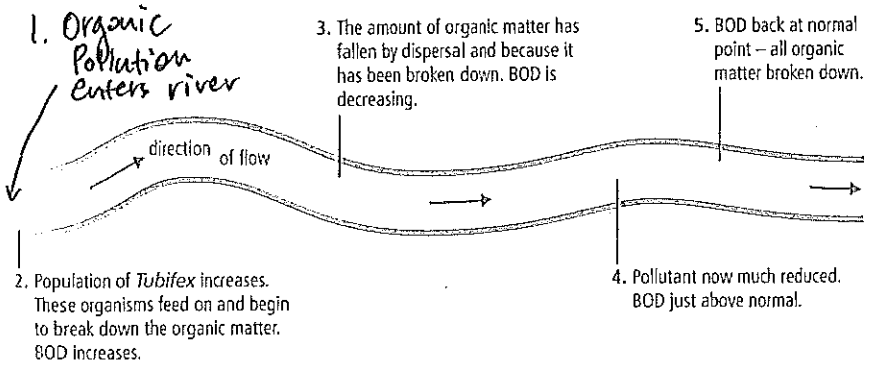
How to ✓ for BOD

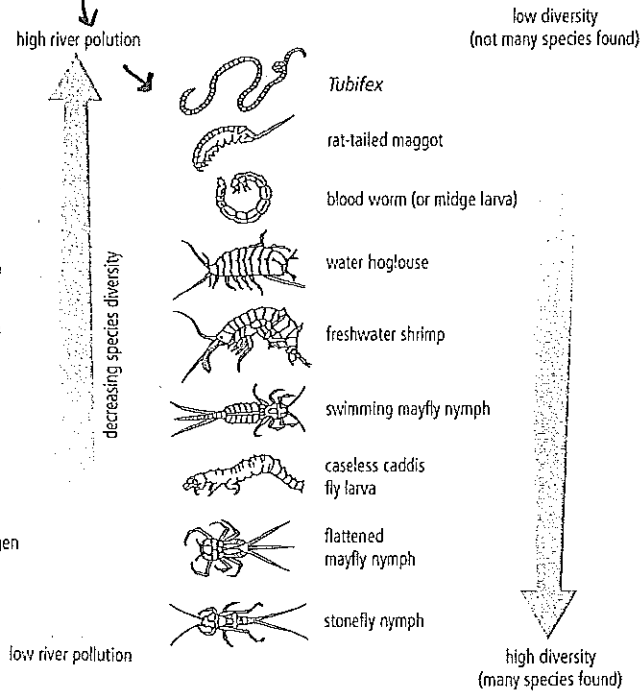
1. Sample of H_2O in a measured volume
2. Measure O_2 level
3. Place in Dark @ 20°C for 5 days
4. After 5 days measure O_2
5. BOD = Measurement 1 − measurement 2

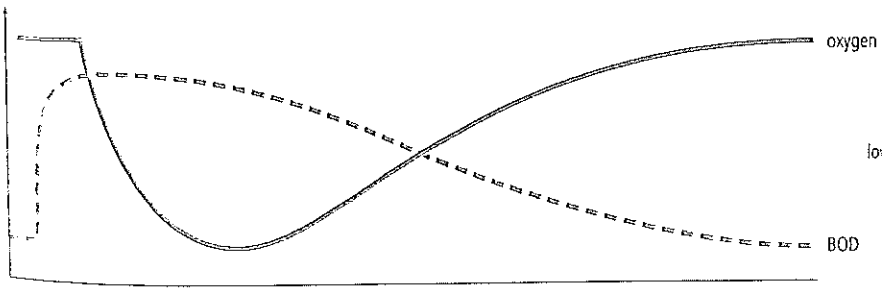
Can also be used in conjunction with INDICATOR SPECIES

↑ found in only certain conditions. Their presence tells us about their enviro.

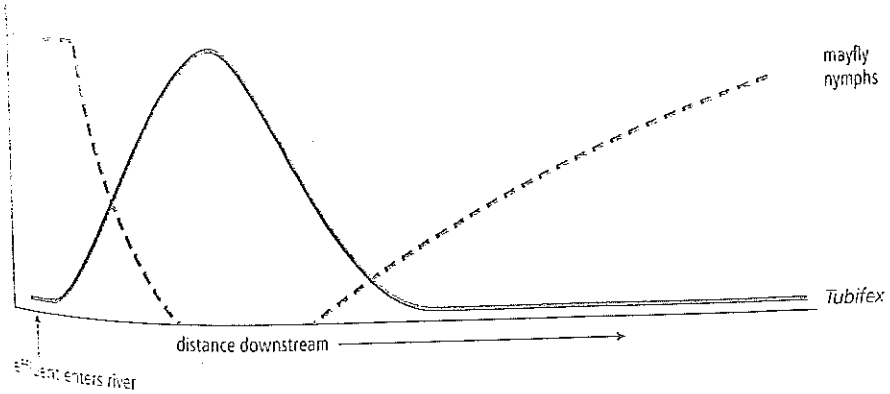
FOR EXAMPLE:







↖ What Happens to BOD & Oxygen?



↖ What Happens to Tolerent Organisms (Tubifex) & sensitive Organisms? (Mayfly nymphs)

5.2.3 Describe and explain an indirect method of measuring pollution levels using a biotic index

gives a measurement of the quality of an ecosystem by the presence or absence of organisms

- Tolerant Spp. are able to deal with high levels of pollutants (not necess. all pollutants, but some)
  ex. Worms, maggots, blood worm (Tubifex)

- Moderately Tolerant Spp are able to deal with medium levels of Pollutants
  ex. freshwater shrimps, mayfly nymph (swimming)

- Sensitive Spp – can't deal w/ any Pollutants
  ex. stonefly nymph.

↳ Count # of spp. present & use Formula & it will give you a # on a range

↓ example

Sensitive	Somewhat Sensitive	Tolerant
___ caddisfly larvae	✓ beetle larvae	✓ aquatic worms
✓ hellgrammite	✓ clams	✓ blackfly larvae
___ mayfly larvae	___ crane fly larvae	✓ leeches
___ gilled snails	✓ crayfish	✓ midge fly larvae
___ riffle beetle adult	___ damselfly larvae	✓ lunged snails
___ Stonefly larvae	✓ dragonfly larvae	
___ water penny larvae	___ scuds	
	✓ sowbugs	
	✓ fishfly larvae	
	___ alderfly larvae	
	___ watersnipe larvae	
	✓ whirligig beetle larvae	
Boxes checked x 3 = 3 index value	Boxes checked x 2 = 14 index value	Boxes checked x 1 = 5 index value
TOTAL INDEX VALUE (SUM OF ALL CATAGORIES) 22	Excellent (>22)	Fair (11-16)
	X Good (17-22)	Poor (<11)

even though all the tolerant spp. are checked, there are lots of somewhat sensitive checked & one sensitive checked.

↓

Water Quality is "good"